

**THERMOLD
DESIGN &**

DEVELOPMENT, Inc.

LEVEL

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JUN 19 1981
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FINAL PROGRESS REPORT

Contract DAAK10-79-C-0403

January 15, 1981

(13) DAAK10-79-C-0403

The purpose of this contract was to study the feasibility of designing and making a spring that would lie inert for a long period, in a relaxed mode, in a preloaded rifle magazine, with the capability of being instantly charged upon need.

The concept of an inert spring as proposed in U. S. Patent 3,964,199 was deemed a possible solution to this requirement. After careful study by Thermold Design & Development, Inc., ARRADCOM, Maryland Precision Spring Co., Inc., and the inventor, it was decided that it was possible to manufacture a spring that would provide adequate lift that could be incorporated into the magazine currently used by the U. S. Army.

Thermold D & D, the contractor, had to design a spring that upon arming with 20 lbs. pressure or less, in a travel distance of 3/4", would provide 6 1/2 lbs. pressure on the magazine follower. In the inert mode, the metal leaves must not exert any pressure upon each other, remain in a stable position ready for actuating, and resist the elements of nature.

In the early stages of the contract, Thermold submitted to a subcontractor the job of stamping different thicknesses of metal into the lengths required for each leaf, but it was quickly realized that the concept was so unique that the entire process would have to be formulated in the facilities of Thermold D&D. It became apparent to Thermold that the requirements inherent in successful design of the spring lead to opposing forces that worked against each other.

Thermold designed and built over 10 dies for the manufacture of the spring in different configurations and thicknesses. We were successful in making a spring that developed the required lift per leaf. It was ascertained through tests that 32 to 36 leaves would provide the necessary pressure to make the 30 round magazine function fully loaded or loaded with one or two rounds.

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A top leaf was slotted to take the regular issue follower with modification only to the underside post. After many design patterns and tests, a charging plunger was proven worthy that would lend itself to inexpensive mass production if required.

Although the spring would function as required in pairs, it was impossible to incorporate the required number of leaves into a magazine as the pressure required to charge the spring system was so great that the ends of the leaves would resist the directional changes to the point they would distort.

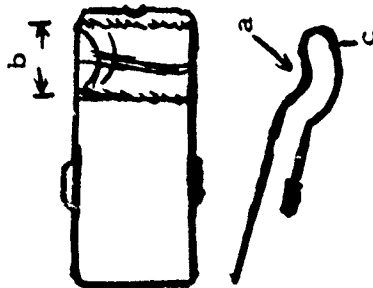
Thermold exerted every effort within its capability to overcome this problem. Different thicknesses of metal would not solve the problem as the combined thicknesses of the lightest material used still added up to over 3/4-inch of steel working against itself. The greater degree of radius, the greater the lift; but the greater radius increases the forces required to slide the leaves together at a greater rate. Each leaf end is required to change direction of travel in the middle of the trip at the worst moment.

It was the arming problem to which Thermold D & D addressed its efforts in the later stages of the contract. A set of springs of the design type thought best was Teflon coated to military specifications, to no avail. Changes were made in the heat treating process but no solution was forthcoming. After consultation with all parties involved, Thermold D&D tried a new design without a curve. This design incorporated a spring with a "V" shaped end, and although providing the required lift, the distortion rate was greater than the curve design.

It is the opinion of Thermold D & D that the spring could probably be made to work in a straight magazine that takes a longer cartridge, thus allowing a longer spring and less acute radials. This magazine would then have less capacity. Thermold D & D deems it impossible to make the concept of Patent 3,964,199 function properly in the 30 round, .223 magazine now in use.

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THERMOLO DESIGN & DEVELOPMENT



INERT SPRING Type I

SCALE: 1" = 1"

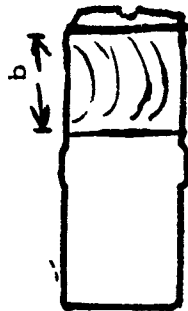
DATE:

APPROVED BY

DRAWN BY

a. shallow radius b. short radius length c. no lip

DRAWING NUMBER



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INERT SPRING Type II

SCALE: 1" = 1"

APPROVED BY

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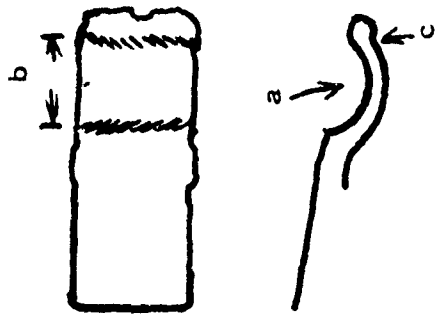
DATE:

a. deeper radius B. longer radius C. no lip

DRAWING NUMBER

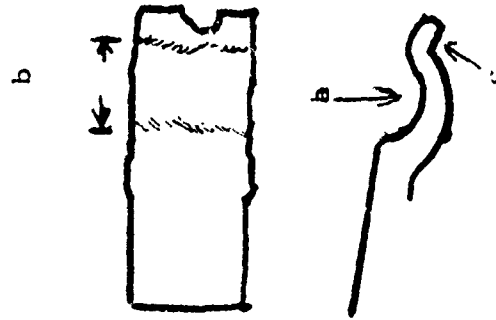
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THERMOLD DESIGN & DEVELOPMENT



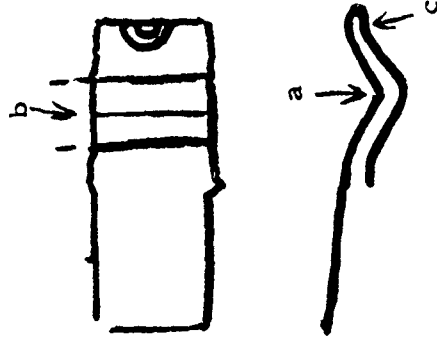
INERT SPRING		Type III	
SCALE: 1" = 1"	APPROVED BY	DRAWN BY	
DATE:			
a. deeper radius	b. shorter radius	c. short lip	
			DRAWING NUMBER
			3

THERMOLO DESIGN & DEVELOPMENT



INERT SPRING		Type IV
SCALE: 1" - 1"	APPROVED BY	DRAWN BY
DATE:		
a. longer radius b. radius same as type III C. longer lip		
DRAWING NUMBER		4

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INERT SPRING Type V

SCALE: 1" = 1"

APPROVED BY

DRAWN BY

DATE:

a. no radius b. "V" type C. lip same as type IV

DRAWING NUMBER

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